2.3 HOMEWORK HANDOUT: EXPONENT LAWS, PART 1

PART A

1) Express each of the following as a single power.

a) $5^2 \times 5^{10}$ b) $\left(2.4^3\right)\left(2.4^8\right)$ c) $\left(x^{15}\right)\left(x^3\right)$ d) $1.5\left(1.5^{12}\right)$ e) $m^3\left(m^6\right)$

f) $\left(\frac{2}{3}\right)^4\left(\frac{2}{3}\right)^6$ g) $\left(7^5\right)\left(7^3\right)\left(7^4\right)$ h) $a\left(a^9\right)\left(a^2\right)$ i) $\left(\frac{1}{6}\right)^2\left(\frac{1}{6}\right)^5\left(\frac{1}{6}\right)^7\left(\frac{1}{6}\right)^3$

2) Express each of the following as a single power.

a) $15^{14} \div 15^6$ b) $\frac{(-8)^{10}}{(-8)^3}$ c) $\frac{b^{13}}{b^4}$ d) $\left(\frac{3}{7}\right)^{10} \div \left(\frac{3}{7}\right)^4$ e) $\frac{3.78^9}{3.78^5}$ f) $\frac{\left(\frac{1}{3}\right)^7}{\left(\frac{1}{3}\right)^3}$

3) Simplify. (Express as a single power.)

a) $\frac{\left(5^8\right)\left(5^9\right)}{5^7}$ b) $\frac{x^8\left(x^{10}\right)}{x^4}$ c) $\frac{\left(\frac{5}{6}\right)^{17}}{\left(\frac{5}{6}\right)^8\left(\frac{5}{6}\right)^4}$ d) $\frac{a^5\left(a^7\right)}{a\left(a^6\right)}$ e) $\frac{y^4y^5}{y^6y^2}$ f) $x^2\left(\frac{x^{11}}{x^5}\right)$

g) $\frac{(-6)^{12}}{-6(-6)^2(-6)^3}$ h) $\frac{\left(\frac{7}{8}\right)^{15} \div \left(\frac{7}{8}\right)^8}{\left(\frac{7}{8}\right)^2\left(\frac{7}{8}\right)^3}$ i) $\left(\frac{x^{20}}{x^{14}}\right)\left(\frac{x^{18}}{x^{15}}\right)$ j) $\frac{4.2^{13}}{4.2^5} \div \frac{4.2^8}{4.2^3}$

4) Simplify and then evaluate for $x = 2$ and $y = 3$.

a) $(x)\left(x^2\right)\left(x^3\right)$ b) $\frac{\left(x^5\right)\left(x^4\right)\left(x^{10}\right)}{\left(x^6\right)\left(x^8\right)}$ c) $y^2\left(\frac{y^8}{y^7}\right)$ d) $\left(\frac{y^6}{y^4}\right)\left(\frac{y^9}{y^7}\right)$ e) $\frac{\left(\frac{x^{19}}{x^8}\right)}{\left(\frac{x^6}{x^2}\right)}$

5) Multiply.

a) $3 \times 2x$ b) $5(4x)$ c) $-2(7y)$ d) $10 \times 3x^2$ e) $x(9x)$

f) $(5x)(3x)$ g) $-2m(6m)$ h) $y\left(8y^2\right)$ i) $\left(-5p^2\right)\left(-3p^2\right)$ j) $2(5x)\left(-3x^2\right)$

6) Divide.

a) $6x \div 2$ b) $\frac{-12x}{4}$ c) $\frac{15x}{x}$ d) $\frac{14y}{7y}$ e) $\frac{25n^2}{n^2}$ f) $\frac{24h^2}{3h^2}$

g) $\frac{9x^2}{x}$ h) $\frac{-28x^3}{x}$ i) $\frac{16x^4}{8x^2}$ j) $\frac{-20r^6}{-4r^2}$ k) $-\frac{75u^{10}}{15u^7}$ l) $\frac{27x^{14}}{-3x^{10}}$

7) Multiply.

a) $4\times 6xy$ b) $(-2)(7xy)$ c) $6a\times 2b$ d) $(4m)(-3n)$

e) $(8x)(9yz)$ f) $9ab(4c)$ g) $(-2pq)(-10r)$ h) $17xy(-3z^2)$

8) Divide.

a) $16xy \div 2$ b) $\frac{32ab}{8}$ c) $\frac{24xy}{6x}$ d) $\frac{-36pqr}{9r}$ e) $\frac{60abc}{10ab}$ f) $\frac{-22st^2}{-11t^2}$

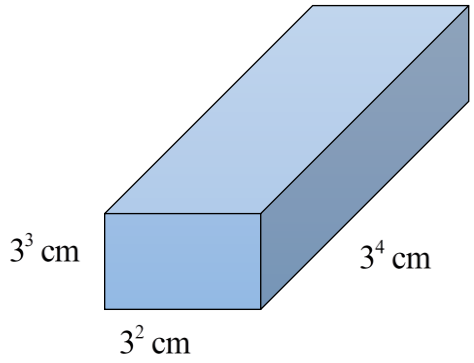
9) Simplify.

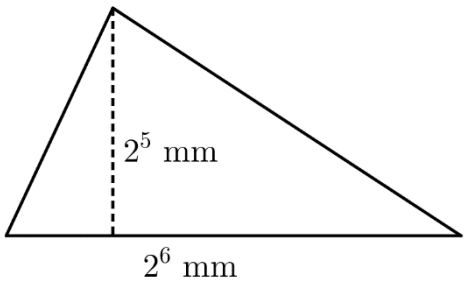
a) $\frac{4(3x)}{6}$ b) $\frac{(5x)(6x)}{15}$ c) $\frac{10(2x)}{5x}$ d) $\frac{(-3y)(12y)}{9y}$ e) $\frac{(12a)(4a)}{8a^2}$

f) $\frac{(3x)(16y)}{4}$ g) $\frac{-4(10xy)}{5xy}$ h) $\frac{(16m)(2n)}{4m}$ i) $\frac{(20q)(3r)}{(2q)(15r)}$ j) $\frac{2x(-2y)(-12z)}{24xz}$

PART B

10) Determine the volume of the rectangular prism shown on the right. Express your answer as a power.



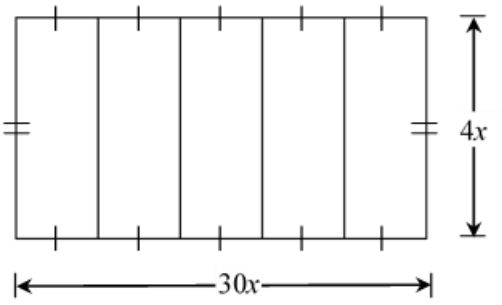


11) Determine the area of the triangle shown on the left. Express your answer as a power.

12) A rectangle is divided into 5 equal sections as shown on the right.

a) Determine a simplified expression that represents the area of the entire rectangle.

b) Determine a simplified expression that represents the area of one section.



13) The length of a triangle's base is $5x^2y^3$ cm and its height is $4xy^2$ cm.
   a) Determine a simplified expression for the area of the triangle.
   b) If the triangle is the base of a prism with a length of x cm, find a simplified expression for the volume of the prism.
   c) If $x = 4$ cm and $y = 3$ cm, determine the area of the triangle and the volume of the triangular prism.

14) The product of two powers is 5^{12}. The quotient of the same two powers is 5^6. Find the two powers.

ANSWERS

1) a) 5^{12} b) 2.4^{11} c) x^{18} d) 1.5^{13} e) m^9 f) $\left(\frac{2}{3}\right)^{10}$ g) 7^{12} h) a^{12} i) $\left(\frac{1}{6}\right)^{17}$

2) a) 15^8 b) $(-8)^7$ c) b^9 d) $\left(\frac{3}{7}\right)^6$ e) 3.78^4 f) $\left(\frac{1}{3}\right)^4$

3) a) 5^{10} b) x^{14} c) $\left(\frac{5}{6}\right)^5$ d) a^5 e) y

f) x^8 g) $(-6)^6$ h) $\left(\frac{7}{8}\right)^2$ i) x^9 j) 4.2^3

4) a) x^6 ; 64 b) x^5 ; 32 c) y^3 ; 27 d) y^4 ; 81 e) x^7 ; 128

5) a) $6x$ b) $20x$ c) $-14y$ d) $30x^2$ e) $9x^2$ f) $15x^2$ g) $-12m^2$ h) $8y^3$ i) $15p^4$ j) $-30x^3$

6) a) $3x$ b) $-3x$ c) 15 d) 2 e) 25 f) 8 g) $9x$ h) $-28x^2$ i) $2x^2$ j) $5r^4$ k) $-5u^3$ l) $-9x^4$

7) a) $24xy$ b) $-14xy$ c) $12ab$ d) $-12mn$ e) $72xyz$ f) $36abc$ g) $20pqr$ h) $-51xyz^2$

8) a) $8xy$ b) $4ab$ c) $4y$ d) $-4pq$ e) $6c$ f) $2s$

9) a) $2x$ b) $2x^2$ c) 4 d) $-4y$ e) 6 f) $12xy$ g) -8 h) $8n$ i) 2 j) $2y$

10) 3^9 cm^3 **11)** 2^{10} mm^2 **12)** a) $120x^2$ b) $24x^2$

13) a) $10x^3y^5$ cm^2 b) $10x^4y^5$ cm^3

c) area of triangle $= 155520$ cm^2, volume of prism $= 622080$ cm^3

14) 5^9 and 5^3